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Field Experiments Section

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FIELD EXPERIMENTS SECTION

G. V. DYKE

The field experiments at Rothamsted and Woburn are controlled by the Field Plots Committee: F. Yates (Chairman), G. V. Dyke (Secretary), F. C. Bawden, G. W. Cooke, H. V. Garner, P. H. Gregory, J. R. Moffatt, C. A. Thorold, R. G. Warren and D. J. Watson. During 1960 the Committee discussed with R. Hull some of the experiments (mainly long-term) proposed for Broom's Barn Experimental Station.

TABLE 1

Classical experiments:	Grain	Roots	Hay	Grazing	Total
Rothamsted ...	238	—	130	—	368
Woburn ...	50	—	—	—	50
<i>Long-period rotation experiments:</i>					
Rothamsted ...	442	291	199	96	1,028
Woburn ...	181	283	55	12	531
<i>Short-period experiments:</i>					
Rothamsted ...	694	160	—	—	854
Woburn ...	271	49	—	—	320
Total ...	1,876	783	384	108	3,151

Table 1 shows the total number of large plots harvested by the staff of the two farms and how they were distributed between different crops and experiments of different types. Three hundred and fifty-nine large plots were managed but not harvested by the farm staff. In addition, the departments laid down 158 large plots and 1,228 micro-plots; the total was 4,896.

Broadbalk

The wheat was drilled in October in good conditions and came well through the winter. By harvest-time vetches (*Vicia sativa*) were abundant on some plots and caused severe lodging on a few. On the remaining plots lodging was widespread but generally slight. The investigation of the relative efficiency of three methods of sampling the grain to determine the proportion of weed seeds and rubbish was continued.

Hoosfield Permanent Barley

Spraying against coltsfoot (*Tussilago farfara*) continued (see *Rep. Rothamst. exp. Sta.* for 1959, p. 159) with apparently good results. After harvest the whole area was sprayed with dalapon to control small patches of couch grass (*Agropyron repens*). The areas sprayed in autumn 1959 had much less couch in 1960.

At harvest four separate cuts were taken from each plot of full width (but two each from plots 6-1 and 6-2, three each from 7-1 and 7-2). The cuts were marked by blank rows left at sowing.

Except on a few plots straw yields were taken from only one cut per plot.

Park Grass

All yields were measured this year by the flail-type forage harvester, and a scheme was established for the future use of this machine. Sample strips 40 inches wide are cut along the length of each plot, two from narrow plots, four from wide plots. The sample strips will occupy different positions for four seasons, then repeat the cycle. In one season the same strips are used to estimate yield of first and second cuts. Both are weighed fresh and sampled to determine dry matter. At the first cut the remainder of the area is cut by mower and the hay is made on each plot as in the past, but no weights are taken. At the second cutting the whole of the produce is cleared by the forage harvester after the cutting of the sample strips.

The variation between sample strips of the first cut of 1960 was greater on unlimed than on limed halves. If the differences between samples within each plot are used to estimate sampling error the standard errors per plot mean are:

	Not limed		Limed	
	Fresh weight (cwt. per acre)	%	Fresh weight (cwt. per acre)	%
Plots with 4 cuts ...	4.3	9	3.0	5
Plots with 2 cuts ...	4.0	8	2.8	4

These results suggest that the sampling method adopted in 1960 gave reasonably precise estimates of the plot yields. Unless future results show very much more variation between samples, there seems no reason why the technique should not be completely satisfactory for estimating the Park Grass yields.

Exhaustion Land

Throughout the season the differences between the plots were much less than in recent years. Yields also were relatively uniform, the strips without effective manurial residues yielding more than usual.

The stubble was sprayed with dalapon against couch grass (*Agropyron repens*).

Garden Clover

This year each sub-plot (with and without K) was subdivided for a test of molybdenum applied as a spray. The clover grew very irregularly, and there was no visible effect of molybdenum.

Barnfield

Manures were applied as usual, but the land was fallowed to control weeds, including couch grass (*Agropyron repens*). Rotary cultivation and weed-killer spray were both used. In 1961 the fallow will be continued, and manures applied, to prepare for an investigation of the cumulative effects of the long-term treatments.

Potato experiments

Potato lifting was much delayed by excessive rain, and mechanical lifting became impossible. On three experiments potato plots were therefore sampled and yields estimated by hand-digging areas (one per plot) of 0.0035 acres. The standard errors per plot were remarkably small (4.6, 5.3 and 6.1% of the respective mean yields).

Green Manuring at Woburn

The long-term Green Manuring Experiment at Woburn (Stackyard, Series A) since its revision in 1955 has given much greater yields of barley where trefoil or ryegrass was ploughed in (sown after early potatoes in the previous season).

Mean of 6 seasons, 1955-60

	Barley grain, cwt./acre	
	Fertiliser to barley (cwt. N/acre)	
	0.23	0.46
No green manure	18.4	23.6
Trefoil ploughed in in autumn	26.5	28.3
Trefoil ploughed in in spring	30.0	31.4
Ryegrass ploughed in in autumn	22.4	26.4
Ryegrass ploughed in in spring	25.4	31.2

Green manures have also slightly increased the yield of early potatoes.

The interpretation of these effects is complicated by several features of the design of this experiment; the green manuring effects shown in the table contain unknown but probably small residual effects of treatments applied before 1955. Two short-term experiments were laid down in 1960 to investigate the value of green manures and the interaction of their effects with those of nitrogen fertiliser applied directly.

(a) *Stackyard, Series C*

Barley in 1960, followed by sugar beet in 1961. All combinations of two factors will be tested:

- (i) Green manures undersown in barley and ploughed in in spring: none, trefoil, ryegrass, ryegrass with 0.6 cwt. N as "Nitro-Chalk" applied after harvesting barley.
- (ii) Four levels of N applied to sugar beet.

(b) *Lansome Field*

Early potatoes in 1960, barley in 1961. All combinations of two factors:

- (i) Green manures sown in the open after lifting potatoes: none, trefoil, ryegrass, ryegrass with 0.6 cwt. N as "Nitro-Chalk" applied in seedbed.
- (ii) Four levels of N applied to barley.

On both experiments the trefoil failed to make vigorous growth, apparently because of poor nodulation (see p. 86).